

## REMARKS

Reconsideration of the above-identified patent application in view of the remarks following is respectfully requested.

Claims 1-7 and 9-27 are pending in the application. Of the above, claims 14-22-were withdrawn from consideration. Claims 1-7, 11, 13, and 23-27 have been rejected and claim 12 has objected to by the Examiner. Applicant gratefully notes the conditional acceptance of claim 12. The Examiner's rejections and objections are respectfully traversed. Applicant has addressed the objections as indicated below.

The specification and the claim numbering have been corrected as required. Claims 1, 4, 5, 9, 26 and 27 have been amended to comply with Examiner's rejections (claim 1) and objections. Support for the language of amended claims 4, 5, 26 and 27 may be found in the specification in p. 7, lines 30-31, p. 8, paragraph starting on line 16 and p. 9, lines 9-12.

### § 112 Rejections

Claims 4, 5, 9, 26 and 27 have been rejected under 35 U.S.C 112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention and therefore are not treated on their merits. Applicant has amended the language of the abovementioned claims as shown above, and believes that the amended language overcomes the 35 U.S.C 112 rejection.

### § 102 Rejections

Claims 1-3, 6-7, 10, 13 and 23-25 have been rejected under 35 U.S.C 102(b) as being anticipated by Cohen et al (US 5,418,868). The Examiner's rejection is respectfully traversed. Applicant notes that Cohen '868 is discussed in various sections of the present specification While the discussion below concentrates on independent claims 1 and 23, it clearly reflects on all other claims rejected based on 35 U.S.C 102(b).

Applicant respectfully submits that the Examiner's reading of the 3dB adiabatic coupler in Cohen '868 and/or of the adiabatic coupler of the present

invention as cited in claim 1 (and 23) is in error. Elements 60 and 80 in Cohen '868 are output ports (col. 3, line 66) of terminal portion 170. The two waveguides in portion 170 that end in output ports 60 and 80 are symmetric waveguides, which "taper from respective, relatively small and relatively large widths to, typically, standard widths at the output ports 60 and 80" (Cohen, col. 3, lines 64-66). They are consequently NOT equivalent to the constant width asymmetric waveguide branches in claim 1 of the present invention, which are clearly indicated in the specification, p. 7, starting line 28 as "waveguides or branches 28 and 30" in FIG. 1. Branches 28 and 30 in the present invention are adiabatic (namely, vary very slowly), so that light spreads between the waveguides. This provides a completely different effect than that in Cohen '868. Portion 170 does not (and, in fact, must not) take part in an adiabatic effect, and is used just to increase the separation between the two waveguides so that they become optically uncoupled (just like the bends of a standard directional coupler). Portion 170 in Cohen is in fact equivalent to elements (bends) 16 and 18 (combined with tapers 20 and 22) in FIG. 1 of the present invention.

The elements in Cohen '868 that are closer (but not similar) to the asymmetric waveguide branches recited in claim 1 are in fact his waveguide branches 50 and 70, located in central section 150. Per Cohen's description, paragraph starting col. 3, line 45:

"As discussed in C. H. Henry et al., cited above, adiabatic 3-dB coupler 40 comprises a pair of waveguide branches 50, 70 that differ in width (measured in the direction parallel to the substrate surface and transverse to the propagation axis), but are otherwise equivalent. Coupler 40 includes *a central portion 150 in which the separation between the branches is small enough to permit substantial optical coupling between them. (A typical separation is 2-3 $\mu$ m.)* The branches are flared apart in terminal portion 160, which is proximal the MZI, and in terminal portion 170, which is distal the MZI. The upper and lower branches are optionally tapered in portion 160, but in any case should be mutually symmetrical. *In portion 150, the upper waveguide decreases in width in the propagation direction, and the lower waveguide increases in width (or vice versa). From different widths at the point where portion 150 meets portion 170, these waveguides taper to equal widths at the point where portion 150 meets portion 160.* In portion 170, the waveguides taper from respective, relatively small and relatively large widths to, typically, standard widths at the output ports 60 and 80. (The input ports of coupler 40, where coupler 40 meets the MZI, will also typically have standard widths.)"

Elements 50 and 70 in Cohen differ from the asymmetric waveguide elements cited in claim 1 in that they have a varying width and a constant separation in portion

150. They are not "separated over a coupling length by a changing spacing therebetween", but in fact are separated by a constant spacing. This has been pointed out by Applicant in the present specification, p. 2, lines 13-15. In fact, the adiabatic coupler in Cohen '868 has very little in common with that of the present invention, as recited in claim 1 (and 23). Applicant thus respectfully submits that claim 1 is not anticipated by Cohen '868. Moreover, Cohen '868 does not even render the present invention as claimed in claim 1 (and 23) obvious. Applicant further submits that claims 2, 3, 6, 7, 10 and 13 (dependent from claim 1) and 24-25 (dependent from claim 23) are similarly neither anticipated nor rendered obvious by Cohen '868, who in fact teaches away from the adiabatic coupler of the present invention.

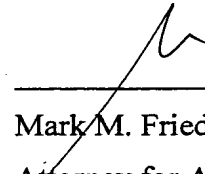
### **§ 103 Rejections**

Claim 11 has been rejected under 35 U.S.C 103(a) as being unpatentable over Cohen et al (US 5,418,868) as applied to claims 1-3, 6-7, 10, 13 and 23-25 above and further in view of Hwang et al., IEEE Photonics Tech. Letters, Vol. 9, No. 6, June 1997 (Hwang), which has also been cited by Applicant and its main disadvantage (straight branches instead of the curved asymmetric waveguides disclosed herein) being pointed out. The Examiner's rejection is respectfully traversed.

Applicant submits that since Cohen does neither anticipate nor render obvious claim 1, the combination of Cohen '868 and Hwang cannot render claim 11 unpatentable. Moreover, as pointed out above, Hwang in fact teaches a completely different structure of branches than that in the present invention.

In view of the above amendments and remarks it is respectfully submitted that claims 1-7 and 9-27 are now in condition for allowance. Prompt notice of allowance is respectfully and earnestly solicited.

Respectfully submitted,



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